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Application of Seismo-Acoustic Signals to the Study of Local Site Effects

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Abstract

The Nevada Seismic Array (NVAR) is a small-aperture seismic array designed for monitoring an eventual nuclear test ban treaty. In spite of the 4 km aperture, large amplitude variations are recorded due to the complicated local geology. This study takes advantage of the collocated infrasound and seismic sensors to discuss the use of air-to-ground coupled waves to characterize the shallow geological structure existing beneath the array.

Complex transfer functions between the infrasound and the corresponding seismic signals are computed as the quotient of the cross-spectrum of the infrasound signal and the seismic signal and the power spectrum of the infrasound signal. Then the median of the transfer functions for the sites where shallow geologic information is available is compared to a theoretical model. In the theoretical approach, the signals are modeled as instantaneous pressure loads propagating at sound speed velocities (330 m/s). Both theory and observations are in agreement which suggests that inverting the transfer functions to determine elastic properties of the medium, and eventually computing site effects, is possible.

Key words: seismo-acoustic signals, infrasound area, seismic arrays.

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